REMARKS/ARGUMENTS

Claims 13- 23 are pending. Claim 13 has been amended. Claims 14-16 and 23 are withdrawn.

1. § 112 Rejections-first paragraph

Claims 13 and 17-22

Claims 13 and 17-22 currently stand rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the enablement requirement. Specifically, the Examiner states that these claims contain subject matter "not described in the specification in such a way as to enable one skilled in the art to which it pertains . . . to make and/or use the invention." More specifically, the Examiner asserts that "[i]t is not clear what is meant by 'orthogonal multiplexing' from the specification and claims" and that "[i]t is further unclear how the different dimensions are used." Applicants respectfully traverse this rejection and demonstrate below how the specification and claims would be understood by one of ordinary skill in the relevant art.

The Person of Ordinary Skill

As may be seen from "Background of the Invention" section of the present application, the invention is related to "fast switching "optical communications or interconnection systems" (paragraph [0002]) such as those useful in "managing information flows such as those required by the interconnected parallel processing architectures of highly parallel supercomputers" (paragraph [0004]). The person of ordinary skill in the relevant art is thus a person of some skill and knowledge in the area of communication technologies generally, and particularly optical interconnection and communication systems, and in computer science generally, and particularly in computer interconnection architectures.

Understanding "Orthogonal" and "Orthogonal Multiplexing" by One of Skill in the Relevant Art

Persons of skill in the art of optical communications and/or computer science understand "orthogonal" to have, as one of its principal meanings, "mutually independent." See, for example, the entry for "orthogonal" in Geek.com Glossary of

Technical Terms (http://www.geek.com/technical-glossary/?titlesearch=orthogonal), which reads as follows:

> Orthogonal
> This term is used to describe two or more things that are independent of one another. Also, it is a mathematical term that refers to vectors that meet at right angles.

See also the entry for "orthogonal" in the Free On-Line Dictionary of Computing (http://foldoc.org/).

In communications, orthogonal addressing or multiplexing schemes are understood as those in which a receiver can "tune in" or select a desired signal independently of—that is, without undue interference from—other signals that are present in the scheme. In such a scheme, individual signals are mutually independent in that they can be transmitted and received simultaneously without interfering with each other.

In computer science, "orthogonal" addressing refers to addressing systems in which the dimensions of the address space, such as rows and columns, for example, are mutually independent in that each can be specified individually and without interfering with each other. Accessing or addressing a particular row does not limit the columns that can be selected, and selecting a particular column does not restrict the row that can be selected. This usage of the term is found in describing addressing rows and columns of memory, or rows and columns of pixels in a computer display. Also in computer science, "orthogonal" instruction sets are instruction sets in which the particular processor instruction, the particular memory register to be used, and the particular addressing mode used to address the register are mutually independent, in that any instruction can use any register in any addressing mode.

"Orthogonal multiplexing" or multiplexing in "orthogonal domains" (see paragraph [0038]) as used in the specification and claims of the present application is simply understood by those of skill in the art as multiplexing signals in mutually independent domains. This may be seen in the example in the specification of the present application described with respect to Figure 1. In this example, fiber and wavelength are the two "orthogonal" or mutually independent domains utilized (paragraph [0038]). As

stated in the specification, "[e]ach source, through its corresponding modulator [of the array of modulators 14], is assigned a unique fiber-wavelength coordinate pair" (paragraph [0039]). This comes about because respective wavelengths are supplied to the respective modulators of the array of modulators 14 such that the wavelengths carried in the fibers vary in the direction 16, but are the same in the direction 18. Thus, in this example, eight different wavelengths are employed. In the array of fibers 15, the respective transport fibers 12, to which signals from the respective fibers of the array of fibers 15 are fed, vary in the direction 18, but are the same in the direction 16. Thus, for each respective modulator in the array of modulators 14, signals from that modulator are sent with a respective one of eight wavelengths along a respective one of eight transport fibers. Thus the signal from each modulator can be distinguished by its particular fiber and wavelength. Thus, in this example, fibers and wavelengths are analogous to rows and columns of an addressing scheme, and "[e]ach source, through its corresponding modulator [of the array of modulators 14], is assigned a unique fiber-wavelength coordinate pair."

Signals carried on a selected fiber of a group of fibers can be selected by an appropriate switch, referred to as a "space switch" of an array of space switches 24 in Figure 1. Signals carried on a particular wavelength of a group of wavelengths can likewise be selected by an appropriate switch, referred to as a "wavelength selector" of an array of wavelength selectors 26. In this way, eight selection legs 30 can independently select the signals from any of the modulators of the array of modulators 14. Selection of one transport fiber (or one transport fiber tap) by one of the space switches does not affect the number of wavelengths present at, nor restrict the selection of wavelengths by, the associated wavelength selector. Selection of one of the wavelengths by one of the wavelength selectors does not affect the number of fibers' signals present at, nor restrict the selection of fibers by, the associated space switch. In this way fiber and wavelength are mutually independent or "orthogonal" in the system of the example in Figure 1.

Extension to higher dimensions than two is explained, in part, in reference to Figure 21, and the use of wavebands together with wavelengths is explained particularly with respect to Figures 18-20. The domains of time division, space, polarization, and

wavelength (including wavebands at one or more levels) are all orthogonal in the same sense as in the example of Figure 1: each can be individually selected by an appropriate switch or selector without affecting the others. Time division multiplexing is well understood in the art, and is not described in detail. Polarization division multiplexing, while less common, is also known and is not described in detail principally because it is simpler than what is described in that it generally only offers two channels (at least in single mode fiber applications).

Regarding how switching is done at highest speeds, the specification states specifically, in paragraph [0057], that "SOA-based switches are the presently preferred technology," and that "t]he SOAs can be electrically or optically actuated—electrically for up to 100ps switching speeds, and optically for faster." Thus the specification discloses that faster than 100ps switching speeds may be obtained specifically by the use of optically-actuated SOAs.

2. § 112 Rejections-second paragraph

Claims 17 and 18 stand rejected under section 112 second paragraph for a broad range limitation together with a narrow range limitation in the same claim. Applicants respectfully traverse.

The section of the MPEP cited by the Examiner provides:

> Use of a narrow numerical range that falls within a broader range in the same claim may render the claim indefinite when the boundaries of the claim are not discernible. Description of examples and preferences is properly set forth in the specification rather than in a single claim. A narrower range or preferred embodiment may also be set forth in another independent claim or in a dependent claim.

(Emphasis added.) As noted in the quoted portion of the MPEP above, a narrower range may be set forth in a dependent claim. Claims 17 and 18 both set forth narrower ranges than claim 13, but this is appropriate as they are both dependent from claim 13, and are thus understood to be narrowing the scope of claim 13 in some fashion.

3. § 103 Rejections

Claims 13, 17, and 18 under 35 U.S.C. §103(a) as being unpatentable over Suemura, et al (6,333,800) in view of Hill, et al (5,241,409). Claim 13, as amended, recites "selection subsystems including one or more optically actuated SOAs." The amendment is supported in the specification by paragraph [0057] referred to above. As best understood by Applicants, neither Suemura nor Hill nor Suemura in view of Hill teaches of suggests the combination recited in claim 13, particularly with the used of optically actuated SOAs. Claim 13, together with the remaining claims which all depend therefrom, are believed to be allowable on at least this basis.

Conclusion

Based upon the above amendments, remarks, and papers of record, applicants believe the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Applicants believe that a three-month extension of time is necessary to make this Reply timely. Should applicants be in error, applicants respectfully request that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Gregory V. Bean, 607-974-2698.

5 Nov. 2007
Date

CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. § 1.8

I hereby certify that this paper and any papers referred to herein are being deposited with the U.S. Postal Service, as first class mail, postage prepaid, addressed to the Commissioner of Patents, Alexandria, VA 22313-1450 on: 5 Nov 07

Date

5 Nov 07

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Respectfully submitted,
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